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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/502,110	03/11/2005	Cheng C. Ko	10555-085	2111
757 7590 02/09/2007 BRINKS HOFER GILSON & LIONE P.O. BOX 10395 CHICAGO, IL 60610			EXAMINER TRAN, MINH LOAN	
			ART UNIT	PAPER NUMBER
			2826	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/09/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/502,110

Applicant(s)

KO ET AL.

Examiner

Minh-Loan T. Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

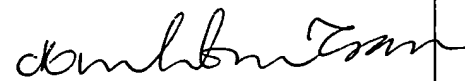
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 17-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-8 is/are allowed.
- 6) ☒ Claim(s) 17-19 and 21-25 is/are rejected.
- 7) ☒ Claim(s) 20, 26 and 27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.


Minhloan Tran
Primary Examiner
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Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>See Continuation Sheet</u> . | 6) <input type="checkbox"/> Other: _____ |

Continuation of Attachment(s) 3. Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date
:7/24/06,2/27/06,5/27/05,9/20/04.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-8 and 17-27 in the reply filed on 01/17/2006 is acknowledged.

Information Disclosure Statement

2. The Information Disclosure Statements filed on 07/24/2006, 02/27/2006, 05/27/2005 and 09/20/2004 have been considered.

Oath/Declaration

3. The oath or declaration filed on 03/11/2005 is acceptable.

Drawings

4. The drawings filed on 07/21/2004 are acceptable.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 17 is rejected under 35 U.S.C. 102(b) as being anticipated by Yasuda et al. (4,840,916).

Figures 3 and 4 of Yasuda disclose an avalanche photodiode comprising a first n-type semiconductor layer 2 defining a contact area 12 wherein an n-type contact layer 1 being disposed adjacent to the first n-type semiconductor layer 2; a second n-type semiconductor layer 18 having a p-type diffusion region 8 having an area smaller than the area of the second n-type semiconductor layer 18; an n-type semiconductor multiplication layer 5; an n-type InGaAs absorption layer 3; a p-type contact layer 17 wherein the p-type diffusion 8 is disposed directly adjacent to the p-type contact layer 17.

Claims 19, 21, 23, 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Watanabe (5,552,629).

With regard to claim 19, figures 1 and 2 of Watanabe disclose an avalanche photodiode comprising an n-type semiconductor layer 31 defining a contact area 38; a semiconductor multiplication layer 33; a semiconductor absorption layer 35 wherein the semiconductor multiplication layer 33 being disposed between the first n-type semiconductor layer 31 and the semiconductor absorption layer 35; a p-type contact layer 37 having a smaller area than that of the absorption layer 35 (because the edge of the mesa forming the avalanche photodiode is slanted); the semiconductor absorption layer 35 being disposed between the semiconductor multiplication layer 33 and the p-type semiconductor contact layer 37. It is inherent that the avalanche photodiode of Watanabe has a low field region near the p-type semiconductor contact layer 37 and a low capacitance because the semiconductor absorption layer 35 being formed closed to the p-type semiconductor contact layer 37.

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With regard to claim 21, figures 1 and 2 of Watanabe disclose a p-type semiconductor charge control layer 34 being disposed adjacent to the semiconductor multiplication layer 33.

With regard to claim 23, figures 1 and 2 of Watanabe disclose the semiconductor multiplication layer 33 is InAlAs. Note lines 3 and 4 in column 4 of Watanabe.

With regard to claim 24, figures 1 and 2 of Watanabe disclose the semiconductor absorption layer 35 is InGaAs. Note lines 6 and 7 in column 4 of Watanabe.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda et al. (4,840,916).

Figures 3 and 4 of Yasuda et al. do not disclose the n-type semiconductor layer is InAlAs, the semiconductor layer InAlAs, the semiconductor multiplication layer is InAlAs. However, it would have been obvious to one of ordinary skill in the art to form the avalanche photodiode of Yasuda et al. having the n-type semiconductor layer is InAlAs, the semiconductor layer InAlAs, the semiconductor multiplication layer is InAlAs in order to improve the lattice mismatched between the semiconductor layers. Further, although figures 3 and 4 of Yasuda et al. do not teach exact the material of the n-type

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semiconductor layer and the multiplication layer as that claimed by Applicant, the material differences are considered obvious design choices and are not patentable unless unobvious or unexpected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note *In re Leshin*, 125 USPQ 416, *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

Claims 22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda et al. (4,840,916).

Figures 1 and 2 of Watanabe do not disclose the n-type semiconductor layer is InAlAs and the p-type semiconductor contact layer is InAlAs. However, it would have been obvious to one of ordinary skill in the art to form the avalanche photodiode of Watanabe having the n-type semiconductor layer is InAlAs and the p-type semiconductor contact layer is InAlAs in order to improve the lattice mismatched between the semiconductor layers. Further, although figures 1 and 2 of Watanabe do not teach exact the material of the n-type semiconductor layer and the p-type semiconductor contact layer as that claimed by Applicant, the material differences are considered obvious design choices and are not patentable unless unobvious or unexpected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note *In re Leshin*, 125 USPQ 416, *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Circ. 1990).

Allowable Subject Matter

7. Claims 1-8 are allowed.

The prior art of record taken either singly or in combination fails to anticipate or fairly suggest the limitations which the Applicants claim in claims 1-8 in a manner which would warrant a rejection under 35 U.S.C. § 102 or 35 U.S.C. § 103.

There was no prior art found by the examiner that suggested modification or combination with the cited prior art so as to satisfy the combination of the present independent claim 1; especially, the prior art does not disclose the semiconductor absorption layer is disposed between the semiconductor multiplication layer and the n-type semiconductor layer having p-type diffusion region as recited in claim 1.

8. Claims 20, 26, 27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Minh-Loan T. Tran whose telephone number is (571) 272-1922. The examiner can normally be reached on Monday-Friday 9:00 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue A. Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mlt
02/2007



Minh-Loan T. Tran
Primary Examiner
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